WHAT IS CLAIMED IS:

1. An underwater wide-band electroacoustic transducer, comprising:

a plurality of groups of piezoelectric ceramic units, wherein each group of piezoelectric ceramic units has a different dimension and separates from each other by different distances, and the frequency response of the piezoelectric ceramic units are banded together to form a wide bandwidth response; and

an acoustic window material for packaging all the piezoelectric ceramic units through a mold injection.

2. The transducer of claim 1, wherein the piezoelectric ceramic units have a hollow cylindrical shape and the piezoelectric ceramic units in each group differ in radius from the piezoelectric ceramic units in other groups.

3. The transducer of claim 1, wherein the piezoelectric ceramic units having a greater dimension has a resonance frequency peak at a lower frequency and vice versa.

4. The transducer of claim 1, wherein the piezoelectric ceramic units is packaged by placing the underwater wide-band electroacoustic transducer inside a set of mold, preheating the mold to a temperature slightly higher than the temperature for mold injection of the acoustic material, putting the mold inside a vacuum chamber so that air is evacuated, injecting acoustic plastic into the mold and finally heating the entire mold for aging.

5. The transducer of claim 1, wherein the acoustic window material includes a PU plastic compound having an acoustic property ρc very close to that of the water and an

equivalent mass that produces a smooth transmitting response curve for the underwater wide-band electroacoustic transducer.

6. A method of packaging an underwater wide-band electroacoustic transducer, wherein the underwater wide-band electroacoustic transducer comprises of a plurality of groups of piezoelectric ceramic units and an acoustic window material, the assembling and packaging method includes the following steps:

assembling several groups of piezoelectric ceramic units with the ceramic units in each group having a different dimension and a different distance of separation from each other such that the different frequency response provided by each group are banded together to form a wide bandwidth frequency response; and

enclosing the piezoelectric ceramic units with the acoustic window material through a mold injection.

7. The packaging method of claim 6, wherein the piezoelectric ceramic units in each group have a hollow cylindrical shape and the piezoelectric ceramic units in each group has a different radius.

8. The packaging method of claim 6, wherein piezoelectric ceramic units with a larger dimension are selected to obtain a resonance frequency at a lower frequency range and piezoelectric units with a smaller dimension are selected to obtain a resonance frequency at a higher frequency range.

9. The packaging method of claim 6, wherein the process of injecting acoustic window material to package the piezoelectric ceramic units includes the sub-steps of:

placing the underwater wide-band electroacoustic transducer inside a set of mold;

preheating the mold to a temperature slightly higher than the temperature for mold injection of the acoustic plastic;

putting the set of mold inside a vacuum chamber and evacuated air inside of the chamber;

injecting acoustic plastic into the mold; and

heating the entire mold to age the injected acoustic plastic.

10. The packaging method of claim 6, wherein the acoustic window material includes a PU plastic compound having an acoustic property ρc very close to that of the water and an equivalent mass that produces a smooth transmitting response curve for the underwater wide-band electroacoustic transducer.